



## **Dermatoglyphics as a genetic tool and bio-indicator to detect high risk factor in recurrent pregnancy loss**

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**Abstract:** Recurrent pregnancy loss also called recurrent miscarriage, spontaneous abortion; habitual abortion is defined as consecutive loss of three or more pregnancies before five months of gestation. Most of the factors responsible for recurrent pregnancy loss can be genetic abnormalities, uterine abnormalities, endocrine factors, immunological factors, lifestyle changes and hormonal imbalance. The aim of this study was to determine the dermatoglyphic features of patients with recurrent pregnancy loss compare to women with no genetic abnormality. Dermatoglyphic patterns of 100 females (cases) and 100 (control) were analyzed to detect any relation between recurrent pregnancy loss cases and dermatoglyphics. The statistical analysis of data showed significant increase in total finger ridge count (TFRC), absolute finger ridge count (AFRC) in both hands of recurrent pregnancy loss patients as compared to control. The atd angle, Radial loops, whorls in both hands of recurrent pregnancy loss patients also showed significant increase as compared to control. There was decrease in frequency of ulnar loop in both hands of recurrent pregnancy loss patients as compared to control. This study demonstrated that dermatoglyphic patterns are correlated with recurrent pregnancy loss and could be used as a genetic marker.

**Keywords:** Recurrent Abortions, Dermatoglyphics, Fingerprints, AFRC, TFRC, Genetics, Atd angle, Fingertip patterns, Finger ridge counts.

### **I. Introduction**

Recurrent abortion is defined as the spontaneous loss of pregnancy prior to the 20<sup>th</sup> gestational week of pregnancy. Pregnancy losses which occur during this period of time are said to occur in about 15 percent of pregnancies. The risk of miscarriage increases proportionately to the number of previous miscarriages experienced. Unfortunately, a definite cause has been difficult to determine. Over the years, miscarriages have been observed as a somewhat "normal" finding. However, there has developed a somewhat more aggressive approach over the last 5 to 10 years towards evaluation and management of women with recurrent pregnancy loss [1].

Dermatoglyphics is the scientific learning of ridged skin patterns which can be found on our fingers, palms, toes and soles. The dermatoglyphic patterns make their appearance on volar aspect of palm as early as 6<sup>th</sup> to 7<sup>th</sup> week of gestation. They become prominent and subsequently reach their maximum size by 12<sup>th</sup> week of gestation. Once formed in intrauterine life, these patterns do not change throughout life [2].

Dermatoglyphics is correlated to diseases which are genetically as well as non-genetically related [3]. Several studies have indicated relationship of dermatoglyphics to various genetic disorders like diabetes mellitus ([4], [5]), schizophrenia [6], down syndrome [7], congenital heart disease [8] and Androgenetic alopecia [9]. However, there is no documented work concerning dermatoglyphics in recurrent pregnancy loss patients. The objective of this study was therefore to establish the dermatoglyphic patterns and parameter values of recurrent pregnancy loss patients compare to normal individuals and to rule out statistical difference.

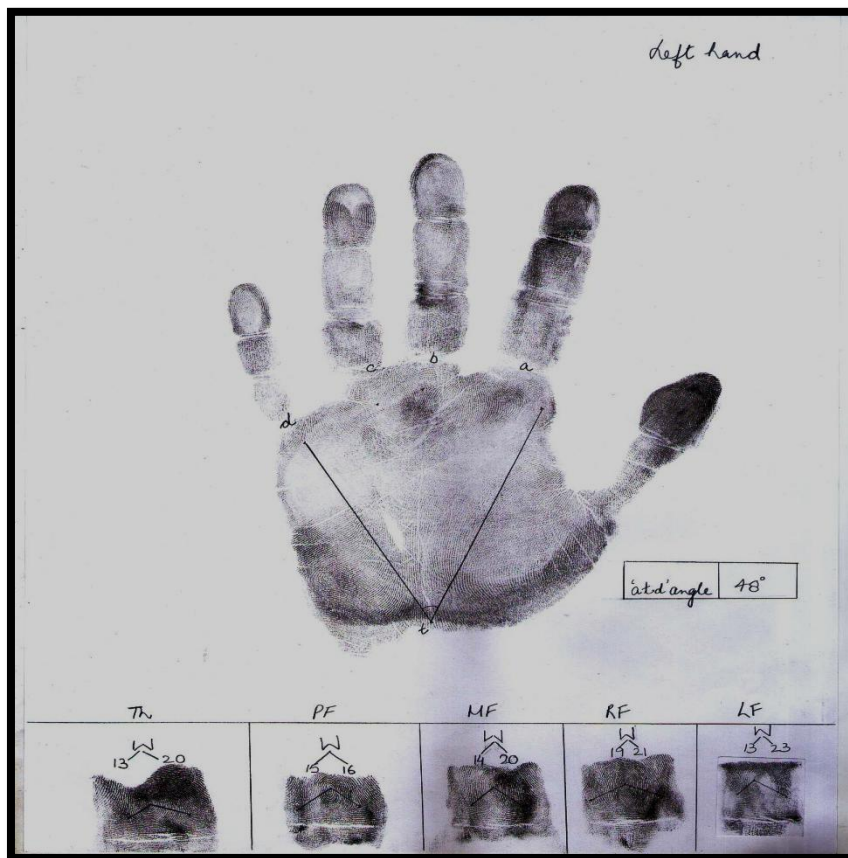
### **II. Materials and Methods**

The present study has been carried out on 200 individuals all above 25 years of age group. The sample included 100 patients with confirmed recurrent pregnancy loss from Government Gousia Hospital, Srinagar, Kashmir and

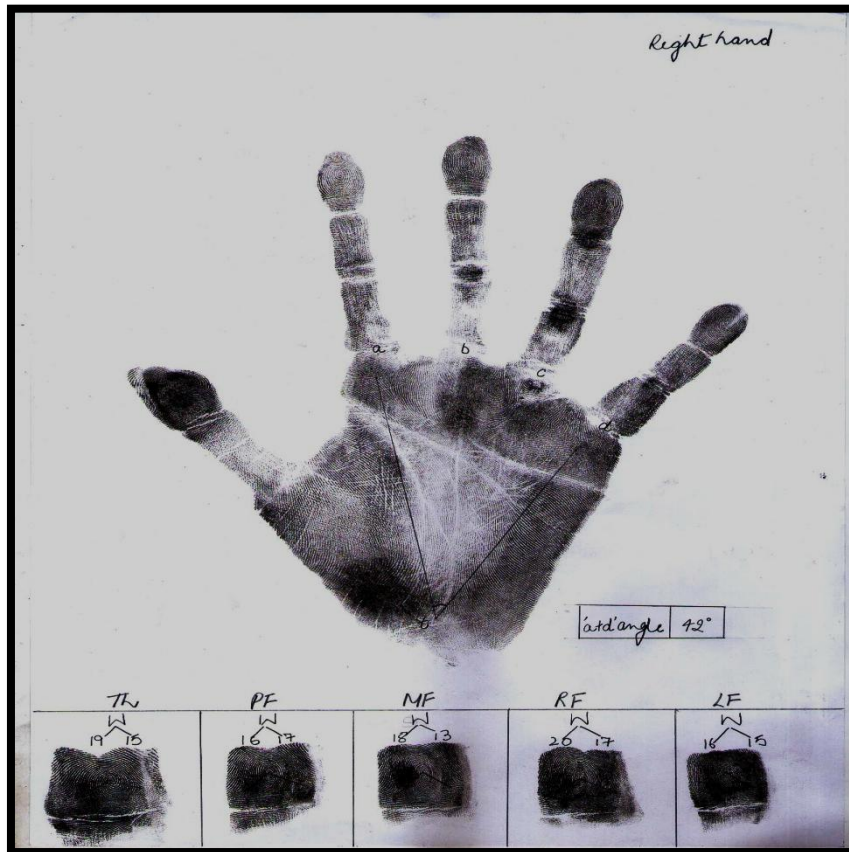
Adithi Maternity & General Nursing Home, Bangalore. The finger prints and palm prints were obtained from both outdoor as well as indoor patients. While selecting patients, all cases with doubtful diagnosis of any genetic disorder were excluded. The control group constituted of 100 healthy normal females all above 25 years of age without any hereditary diseases or genetic disorder. A written informed consent was obtained from all.

Dermatoglyphic prints were taken by 'INK METHOD' described by Cummins (1936) [10]. The materials required for dermatoglyphics prints are kajal (carbon source), A4 size paper, tissue paper or cotton, Towel, Pressure pad, Spirit, Soap & water. Kajal was used because of its constituent camphor as it is attributed by its antiseptic property [11]. Instruments which were used for qualitative and quantitative analysis for the study are pencil, Compound magnifying lens, Protractor & Scale. The subjects were asked to clean their hands with soap & water and to dry them but leave some moisture. The Kajal applicator was used to cover the entire palm, including the wrist crease, the hypothenar border and digit [11]. A sheet of paper was placed on cardboard on a flat, stable surface. The kajal is spread evenly to fill the concavity of the palm to make sure complete palm impression is obtained. The hands of subject were placed on the sheet of paper from proximal to distal end. The back of the palm is pressed firmly to make sure the hollow of palm is printed. The palm was gently lifted from the paper in the reverse order from distal to proximal end. The fingers were rolled from radial to ulnar side to include all the patterns. The prints were subjected for detail dermatoglyphic analysis using magnifying hand lens. Qualitative parameters included fingertip patterns radial loops, ulnar loops, arches & whorls & Quantitative parameters included Total finger ridge count- TFRC, Absolute finger ridge count- AFRC & 'atd' angle were studied as shown in Fig1 & Fig 2. For statistical analysis of qualitative data Chi- square test ( $\chi^2$ ) and for quantitative data t-test were applied. Results were tested at 5% level of significance.

**Fig.1: Photograph showing palmar patterns (atd angle) & fingertip patterns in Left hand of Recurrent Pregnancy Loss Patients.**



**Fig.2: Photograph showing palmar patterns (atd angle) & fingertip patterns in Right hand of Recurrent Pregnancy Loss Patients.**



### Statistical method

Comparison of each study variable in patients and controls was done by applying student t-test in case of quantitative data and qualitative data was analyzed by using Chi-square test. The difference is said to be significant if significance i.e.  $P < 0.05$ .

### III. Results

In the present study, there was a significant increase in total finger ridge count (TFRC), absolute finger ridge count (AFRC), atd angle, radial loops and whorls in both hands of Recurrent Pregnancy Loss cases as compared to controls ( $p < 0.0001$ ). There was significant decrease in frequency of Ulnar loops loop in both hands of recurrent pregnancy loss patients as compared to controls ( $p < 0.0001$ ). There was no statistically significant differences observed in the frequency of Arches of Recurrent Pregnancy Loss cases as compared to controls. The results are shown in tables 1-3.

### IV. Discussions

In ancient India, palmistry, an art of fortune telling by reading the pattern of friction ridges and palmar lines dates from about 2000 B.C [12]. Dermatoglyphics has been studied extensively in chromosomal disorders, single gene disorders and those disorders whose genetic basis is not clear. Dermatoglyphic studies have proved quite useful at least in three fields medico-legal, anthropological and clinical.

Dermatoglyphics is a growing discipline and its easy and ready applicability renders it as a useful tool to the clinician. The relevance of dermatoglyphics is not to diagnose, but to prevent by predicting a disease; not for defining an existing disease, but to identify people with genetic predisposition to develop certain diseases [13]. Heredity plays an important role in the formation of dermatoglyphics patterns. The inheritance of

dermatoglyphic traits was initially studied by Galton in 1892, Wilder in 1902, Penrose in 1954 and Holt in 1968 [14].

Very less research has been done on dermatoglyphic features in recurrent pregnancy loss. Hence, the present study is undertaken to find out various dermatoglyphic features in recurrent pregnancy loss patients and compare them with normal individuals.

The present study shows significant increase in frequency ( $p < 0.0001$ ) of whorls (Fig.1 & Fig.2) and Radial loops (Table 1) and low frequency ( $p < 0.0001$ ) of ulnar loops in both hands of Recurrent Pregnancy Loss cases as compared to controls (Table.1). The frequency of arches was statistically non-significant ( $p > 0.05$ ) in both hands of Recurrent Pregnancy Loss cases as compared to control.

The 'atd' angle showed significant increase ( $p < 0.0001$ ) in both hands of recurrent pregnancy loss patients as compared to control (Table.2).

The study also shows significant increase ( $p < 0.0001$ ) in total finger ridge count (TFRC) in recurrent pregnancy loss patients as compared to controls (Table.3). Since the result shows significant increase ( $p < 0.0001$ ) in frequency of whorls in recurrent pregnancy loss patients (Fig.1 & Fig.2), total finger ridge count (TFRC) is increased in recurrent pregnancy loss patients as compared to control. The statistical analysis showed significant increase ( $p < 0.0001$ ) in absolute finger ridge count (AFRC) in recurrent pregnancy loss patients as compared to controls (Table.3).

## V. Conclusion

The results of our present study depicted correlation between recurrent pregnancy loss and ridges. Dermatoglyphics is an upcoming integral part of forensic science and medicine. There is very less study done on dermatoglyphic features in recurrent pregnancy loss. In our present study, statistical analysis of data showed significant increase in whorls, radial loops, total finger ridge count (TFRC), absolute finger ridge count (AFRC) and atd angle in both hands of recurrent pregnancy loss patients. We also found significant decrease in frequency of ulnar loops. Dermatoglyphics has moved from obscurity to acceptability as a diagnostic tool. The correlation of dermatoglyphics with recurrent pregnancy loss is still in its nascent stages and will be of limited use at this stage. More studies in a different population and larger sample size are recommended before arriving to a definite conclusion.

**Table.1: Frequency Percentage (%) Distribution of Fingertip Pattern among Recurrent Pregnancy Loss Cases and Control Group**

Fingertip Pattern	R		L		R+L	
	R P Loss	Control	R P Loss	Control	R P Loss	Control
Arches	6.02	7.33	7.90	6.55	6.96	6.94
Ulnar Loops	58.92*	73.08	53.32*	72.13	56.12*	72.60
Radial Loops	2.83*	2.53	2.61*	2.43	2.72*	2.48
Whorls	35.63*	14.07	33.85*	16.03	34.74*	15.05

**Table 2: Statistical Analysis of 'atd' angle among Recurrent Pregnancy Loss Cases And Control Group (Mean ± S.D.)**

Group	R	L	R+L
R P Loss	42.38 ± 5.10*	43.16 ± 6.93*	85.56 ± 10.67*
Control	39.89 ± 2.01	40.04 ± 1.98	79.93 ± 3.90

**Table 3: Statistical Analysis of Total Finger Ridge Count (TFRC) & Absolute Finger Ridge Count (AFRC) among Recurrent Pregnancy Loss Cases and Control Group (Mean ± S.D.)**

Parameters	R P Loss	Control
TFRC	143.26 ± 24.46*	129.23 ± 21.05
AFRC	189.29 ± 58.23*	162.23 ± 31.32

**Abbreviations:** R P Loss - Recurrent Pregnancy Loss , R- Right hand, L- Left hand, S.D.–Standard deviation, TFRC – Total finger ridge count, AFRC – Absolute finger ridge count,\*  $p < 0.0001$ .

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